Amendments to the Drawings:

Please add new Figure 10 as shown on the attached new sheet of drawings labeled "New Sheet".

REMARKS

Claims 1-13 are pending. By this Amendment, the specification is amended and a new sheet of drawings showing new Figure 10 is added.

Objection to Drawings

The January 19, 2005 Office Action objected to the drawings under 37 C.F.R. § 1.83(a), stating that the control device for controlling the switched reluctance motor including all its circuit elements as claimed in claims 7-13 must be shown or the features canceled from the claims. Applicant respectfully traverses this objection.

New Figure 10 is identical to originally filed Figure 2 except for new reference numerals and for processor 117 within box 114, which represents a control unit according to embodiments of the invention. The originally filed application fully supports new Figure 10. Input for receiving an angular position signal is indicated by the arrow from position sensing means 115. Input for receiving a phase current signal is indicated by the arrow from current sensor 118. Output of the control device is shown by the wide arrow between control device 114 and power converter 113.

Applicant submits that the application satisfies 37 C.F.R. 1.83(a).

35 U.S.C. § 102(b) Rejection

The January 19, 2005 Office Action rejected claims 1, 5, 7, 11, and 13 under 35 U.S.C. § 102(b) over Sugden (U.S. Patent No. 5,652,494). Applicant respectfully traverses this rejection.

Sugden does not relate freewheeling to phase current, as claimed

The claimed invention relates freewheeling to phase current. Sugden does not disclose relating freewheeling to phase current. Accordingly, Applicant submits that the claimed invention is not anticipated by Sugden.

More specifically, claim 1, lines 6-7, recite generating a second signal when phase current reaches a first level, which second signal causes the phase winding to freewheel. Claim 7, lines 11-15, recite a processor arranged to generate a second control signal when a phase current signal indicates that current in the phase winding is at a first level, which second signal causes the phase winding to freewheel. Claim 13, lines 11-15, recite control means arranged to generate a second control signal to actuate a switching arrangement when phase current reaches a threshold and so cause the phase winding to freewheel. Sugden, on the other hand, while mentioning freewheeling initiated in response to a position signal, does not disclose causing the phase winding to freewheel when the phase current of the phase winding reaches a certain level or threshold.

Freewheeling is not implemented by the circuit of Sugden (see column 9, lines 6-32, for example) but may be added to the circuit by adding a further comparator. The comparator in question produces a control signal based on rotor position (see column 8, line 51 to column 9, line 12, for example), and freewheeling is described as being locked to a rotor position or angle (see column 2, lines 28-34, for example). Sugden mentions freewheeling initiated in response to a position signal, but there is no disclosure of causing the phase winding to freewheel when the phase current of the phase winding reaches a certain level or threshold. There is no disclosure of relating freewheel to current. Accordingly, Applicant submits that Sugden does not anticipate

independent claims 1, 7 and 13. Moreover, inasmuch as Sugden is relevant at all, it teaches against the claimed invention because it specifically states that freewheeling is initiated in relation to rotor position (e.g. column 2, lines 28-34).

Sugden does not disclose a continuous current mode of operation, as claimed

Sugden relates to a system in which a position detector has high- and low- resolution outputs to provide a position sensor with fault detection (see e.g. column 3, lines 15-28 of Sugden). Insofar as Sugden relates to the operation of a switched reluctance drive, it discloses the use of low-speed chopping control and high-speed angle control (see e.g. column 7, lines 39-68). However, there is no disclosure of a continuous current mode of operation in Sugden, contrary to what is claimed.

Embodiments of the present invention related to a novel method and apparatus of controlling a switched reluctance machine in continuous current mode, a difficult control problem usually requiring high precision position sensors (as discussed at e.g. page 6, line 14 - page 7, line 12 and page 11, line 18 to page 12, line 21 of the present application). Embodiments of the invention provide a simplified control method and apparatus by initiating freewheeling when the phase current reaches a pre-determined level (I_x in the description). Embodiments of the invention are based on the unexpected realization by the inventor that this does not make a significant change to either the peak current or the waveform, but instead allows control of the level of the standing current (the minimum level of current in a phase winding in continuous current mode) by varying I_x by a small amount. There is no disclosure in Sugden of the underlying realization of the inventor, which is not surprising since Sugden does not relate to control in a continuous current mode.

Applicant submits that the claimed invention is not anticipated by Sugden.

Subject Matter Indicated Allowable

Applicant acknowledges, with appreciation, the indication of allowable subject matter in claims 2-4, 6, 8-10 and 12.

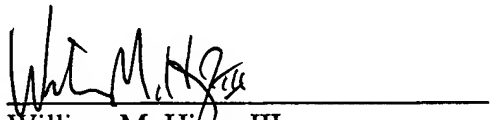
Conclusion

In view of the foregoing, Applicant submits that this application is in condition for allowance. Favorable reconsideration and prompt allowance are requested. The Commissioner is hereby authorized to grant any extensions of time and to charge any fees under 37 C.F.R. § 1.16 and § 1.17 that may be required during the entire pendency of this application, or to credit any overpayment, to Deposit Account No. 500471.

The Examiner is invited to telephone the undersigned to advance prosecution.

Customer No. 025281
DICKE, BILLIG & CZAJA, PLLC
Fifth Street Towers, Suite 2250
100 South Fifth Street
Minneapolis, MN 55402
Telephone: (612) 573-2010
Facsimile: (612) 573-2005

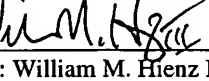
Respectfully submitted,



William M. Hienz III
Reg. No. 37,069

Please grant any extension of time necessary for entry; charge any fee due to Deposit Account No. 500471.

CERTIFICATE UNDER 37 C.F.R. 1.8:
The undersigned hereby certifies that this paper or papers, as described herein, are being deposited in the United States Postal Service, as first class mail with sufficient postage, in an envelope addressed to: Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on this 19th day of April, 2005.

By 
Name: William M. Hienz III